



Which water purification system would be best for you?



WATER PURIFICATION

Modern day water filters and Purifiers came into being about 150 years ago. Earlier, a piece of cloth, was what people used before for filtration. They would sieve the river, pond, well or rain water through a piece of cloth. Once the cloth got dirty or clogged, they would rinse the cloth clean and reuse.

Most probably their drinking water would have been boiled before use.

Modern day filtration still uses the same principle, but the piece of cloth has given way to more sophisticated materials and the boiling water part has been simplified by killing the germs in water by more convenient means. We call it e-boiling! (e-boiling means to treat water with UV, which also kills germs like ordinary boiling).

The common advice is to drink eight glasses of water a day. The body needs water to remain hydrated and function well. Water flushes the toxins out of our systems and helps prevent oxidation. But what if the water we drink is so polluted that instead of cleansing our insides, it makes us sick? Well, we can't stop drinking water; what we can do is find a way to ensure that the water that enters our bodies is safe and clear.

This is where home water purifiers step in. Advances in water purification technology make it possible for us to drink pure and crystal clear water and

stay healthy. Most cutting edge water purifiers not only purify water almost 100 percent but also use technology that eliminates the side effects that earlier purifiers came with.

How does one choose from the plethora of technologies and brands now available in India? Which water purification system would be best for you?

The two parameters of selection here would be degree of purification and price. Different technologies deliver differing degrees of purity. Water may be purified using the following technologies:

- UV purification
- Reverse Osmosis
- Activated carbon filtering
- Distillation
- Ion exchange
- Electro deionization

Domestic water purifiers usually use chemical purification, ultraviolet treatment and filtration, or reverse osmosis. Prices range from less than Rs.2000 to Rs. 25000.


With more and more Indians becoming aware of the hazards of drinking impure water, the demand for effective water purifiers is

The health benefits of using drinking water filters or purifiers are significant. Comprehensive home water purifiers:

- Protect against water borne intestinal disorders and infections – purifiers eliminate bacteria, viruses and pathogens which can cause persistent gastrointestinal upsets. Safe drinking water protects against diarrhoea, amoebic dysentery, cholera, typhoid, jaundice and other ailments. In our country water borne diseases account for more than 75% of illnesses causing enormous financial burden on people.
- Might reduce the risk of developing certain cancers by removing chlorine, which is known to be very harmful. Chlorine releases certain by products which are believed to be cancer causing.
- Prevent oxidation by removing chemical toxins and heavy metals such as copper, cadmium, lead, magnesium, silica and chromium. Lead in particular is very harmful and should not be ingested. The body is never able to throw out the lead when once enters the system.
- Retain essential natural minerals, which are necessary for good health. They restore the PH balance of water. Water that is acidic in nature harms the body. The water that we drink should be alkaline.
- Remove pesticides that can prove to be toxic if allowed to remain in water.
- Eliminate excessive iron and fluoride. Water with high iron content is known to cause constipation and other problems. While fluoride in small quantities aids dental health, a high concentration can damage teeth and bones.
- Remove excessive salt deposits.
- Effectively assist in cleansing the system by providing pure and clear water.

growing rapidly. Majority of intestinal disorders and infections are caused by water borne micro organisms. As a result, the number of consumers looking for reliable purification options is increasing not only in the metros but also in rural towns across India.

Water may contain both biological and chemical contaminants. Biologically contaminated water contains microbes such as viruses, which may result in minor to serious infections, and bacteria that lead to stomach disorders. Common causes of chemical contamination



are improper treatment of industrial waste and pesticide overspill. If chemically contaminated water is used regularly it could lead to serious long term ailments.

Which Method of Water Purification is best for you?

Now that you have decided to buy a water purifier the next step would be to determine which technology to opt for. Domestic water purifiers available in India use chemicals, activated carbon filtration, UV purification, reverse osmosis or a combination of technologies. The quality of water differs from source to source and it is advisable to select a purification system that is best equipped to eliminate the impurities present in the water where you reside. The water purifier you select should ideally depend on the extent and type of contamination together with the TDS (total dissolved solids) level in the water.

Reverse osmosis eliminates 100% of micro organisms such as viruses and bacteria and up to 99.8% of solid suspension including salt if the membrane is a high quality one. Mechanical pressure is used to direct water to flow through a semi permeable membrane that traps all solids of or larger than .0009 microns. RO thus not only frees water of impurities but also desalinates it. However, RO is not always the

best purification method. Reverse Osmosis based purifiers should not be used where TDS levels are low because it could result in water that is completely mineral deficient and thus unsuitable for drinking. RO water purifiers are most suitable for water that is sourced from deep tube wells, hard and saline water with TDS levels above 500 mg/litre and chemically contaminated water.

To select the right water filtration process for your house, it is essential to know the impurities that are present in your water supply. Then choose the right water purifier, which uses the right water purification process to remove those impurities in your water. There is no point in buying complicated and expensive water purifiers when you may just need a simple, cheap and a much more reliable water purifier.

You should get the water you use for drinking, tested by a public lab or a good private lab before deciding which purifier to buy.

If you are getting your water supply from a corporation or municipal water supply, in all likelihood it will not contain dissolved toxic chemicals, like Arsenic, because the water department purifies the water and it is fully tested before it is pumped into the pipelines for distribution. However, this water on its way inside

Boiling is one of the oldest methods of purifying water and is said to kill most micro organisms. Candle water filters are still used in many households across India. However, the pace of life in urban India has quickened so incredibly over the last decade or so that few householders now have the time to treat water manually. Also, mechanized water purification systems are often considered more reliable as far as eliminating micro organisms is concerned.

a pipeline can pick up some dirt, germs and viruses from cracks and leaks in the pipeline. So the water coming to your house from these municipal water sources is safe, in as far as the most dangerous dissolved toxic chemicals are concerned. However it may be contaminated with germs and viruses.

Since Municipal or public water supplies do not have the danger of toxic chemicals in water nor do they have excess dissolved salts, the best solution would be to use an Ultrafiltration (UF) water purifier. The advantage of UF is that it actually filters out and removes all germs and viruses from the final purified water. Other purifiers kill or inactivate the germs and viruses, but their dead or inactive bodies and eggs, still remain in the final purified water. The danger of not filtering out the dead germs is that these supposedly dead or inactive germs or parasite eggs may become active in your stomach later. They could also cause some allergic reactions.

Dissolved toxic contaminants, like Arsenic and Heavy Metals like Mercury, in water are the most dangerous to our health and the most difficult to get rid of. To purify municipal water, all you need is a simple water purifier, which can filter out small particles of dirt and kill all germs and viruses. An Activated carbon filter is recommended, which

not only improves the taste of the water, but will also get rid of any dissolved organic toxic chemicals, like pesticides, in the unlikely event of this getting into the water while in the pipeline. For those of you having the luxury of Corporation, Municipal, or Government water connections, use of reverse osmosis will be a waste of money. The only problem may be that the water may be Hard. Since drinking hard water is not harmful to health, you should not think of putting an RO in the kitchen for your drinking water needs. Hard water is more of a problem for having a bath and washing your clothes as soap does not lather easily.

Reverse Osmosis RO water purifiers or RO systems, can be an option, if your water source is from a well or sources other than Government or Municipal water supply. Those using well water should get their water tested periodically to ensure that the water does not contain residues of fertilizers, pesticides, farm waste, waste from septic tanks, etc. With the right water purifier, it is possible to have pure drinking water from any source. It will be a waste of time and money to depend on bottled water, when you can get pure drinking water by using the right water purifier.

Impurities in Water

Water pollution is the main cause of water borne diseases. Once



we understand this and purify our potable water, many diseases can be avoided. Contamination in water is mainly due to three reasons as explained below:

1. **Dirt or Suspended Solids:** These are the solids which are insoluble like dust, fine sand, clay, rust, etc. They remain suspended in the water and cause cloudiness or discoloration. Total Suspended Solids (TSS) is the technical term used to measure its presence in the water. Turbidity is another technical term used as a measure of the amount of Suspended Solids in the water. A simple filter usually called a sediment filter, with pore size of 20 microns or

lower can remove almost all of the suspended matter in water.

2. **Germs or Microorganisms:** Bacteria, Germs, Pathogens, Microbes, Viruses, Parasites and their eggs (cysts) are collectively known as microorganisms. These minute living organisms, germs, and viruses cause water borne diseases. Water tanks can sometimes be a breeding ground for microbes.
3. **Dissolved Solids:** These are salts and other chemicals that dissolve in the water and cannot be removed by simple filtration. Total Dissolved Solids (TDS) is the technical term used to give

the measure of the amount of dissolved matter in the water and is usually expressed as parts per million (ppm) or as milligrams per litre (mg/L).

Some salts dissolved in water are not toxic in small quantities, but there is a limit which can be tolerated by our bodies. For example Sodium Chloride or the common salt, is being used by us daily to flavor food, but that does not mean that we can drink sea water which contains a high percentage of sodium chloride or salt. Individual salts, dissolved in the water, may not be toxic in small quantities, but there is an upper limit to these dissolved solids in our drinking water.

The World Health Organization or WHO and most of the governments

around the world have set an upper limit for dissolved non toxic salts in water to be 500 ppm or 500 mg/L of water.

Most of our water supplied by municipalities is safe with regards to TDS, but it is a good idea to check. Ordinary filtration cannot get rid of or reduce the TDS in our water. To get rid of dissolved solids it is only possible by Reverse Osmosis (RO) water purification process.

Dissolved Solids

Calcium and Magnesium compounds (Hard Water) are not harmful to health as long as the TDS is within the limits.

Iron causes a rusty or metallic taste in water and it can also stain clothes. Iron and **Manganese** occur naturally and most ground water has some amount of dissolved iron and manganese. **RO** will remove dissolved Iron and Manganese.

Organic Chemicals

Organic chemicals in water make the water smell or taste bad and also give it some discoloration. These impurities of water can be due to pesticides, petroleum products and other toxic chemicals. Chlorine, which is used to keep water free of bacteria, causes another problem by reacting with some organic materials in the water to form harmful chemicals which are all environmental pollutants and are considered to

be **carcinogenic**. Activated Carbon filters are very effective in getting rid of such impurities in water, which normally occur in minute quantities.

Toxic Contaminants

Arsenic

It is very unlikely that the Public water supplies being piped to your homes will have Arsenic in it. However, **people who use well or bore well water have to be extremely careful.** They must have their water tested in a good laboratory. Arsenic occurs naturally in rocks, soils, etc. and water that comes in contact with these rocks and soils becomes contaminated.

Exposure to arsenic can cause severe damage to health. Arsenic poisoning is cumulative; meaning that even very minute amount of arsenic in the water is accumulated in the body over time. What this means is that the body continues to absorb arsenic without getting rid of any arsenic. If Arsenic contaminated water is drunk continuously, then in a few months or years you tend to become very sick. The World Health Organization (WHO) recommends that the maximum level of arsenic in drinking water should not exceed 0.01 mg/L (10 ppb or parts per billion). So in effect they recommend that it should be zero.

Mercury

Mercury is a heavy metal and its compounds are sometimes found in

the natural deposits of certain areas of India. Batteries, fluorescent or tube lights, CFL bulbs, etc. usually contain Mercury and they should not be disposed or thrown on the ground particularly near your water supply source. The maximum contaminant level for mercury set by BIS (Bureau of Indian Standards), WHO (World Health



Organisation), EPA (Environmental Protection Agency of USA) and other well known agencies. It is in parts per billion or ppb. This is a very small negligible limit for mercury – it is so set, because it is a highly toxic chemical. Mercury causes kidney damage and also has many other ill effects. **Activated Carbon filters and RO can remove Mercury from water.**

Lead

Like Mercury, Lead is also a heavy metal, and is harmful to health in the same way as Mercury. Some of the older pipes and fittings contain lead. RO is effective in removing all heavy metal contaminants.

Hexavalent Chromium 6

Chromium is actually a micro nutrient required by our body in minute quantity. This form of Chromium is the safe trivalent or **Chromium-3**. Chromium also exists in another very rare form known as **Hexavalent Chromium** or **Chromium-6**. **Hexavalent Chromium-6** is poisonous and should be guarded against especially by people using well water.

The Environment Protection Agency of USA – EPA has set the Maximum Contaminant Level (**MCL**) of Chromium at 0.1 ppm. There are several methods of getting rid of Hexavalent Chromium-6 from water.

The simplest one is to use an RO unit.

Nitrates in Water

The most common way Nitrates, Nitrites and Ammonia gets into our water sources, is due to the leakage or seepage of fertilizers or farm and animal wastes into the ground water sources. Nitrates in water are especially dangerous to infants under 6 months, causing the blue baby syndrome due to the infant's blood not being able to carry enough



Oxygen from their lungs to their body. Adults may also be affected by nitrates and nitrites in water due to the formation of chemicals called nitrosamine in the digestive tract.

The EPA has set a maximum limit for Nitrates in water as 10 mg/L or ppm measured as NO₃ or Nitrate.

RO is the best purifying method for removal of Nitrates and Nitrites in water.

Fluorides in water

Fluorides are chemicals that contain the element fluorine. Fluorides occur in many water sources naturally. In some countries fluorides are added to drinking water as a health supplement for the protection of teeth and bones. Fluoride in water in very small quantities, about 1 to 1.5 mg/L or ppm, is beneficial to health; but any excess is not good for health. Many toothpaste manufacturers add it in the toothpaste to protect the teeth against cavities. The EPA has set a maximum limit of Fluorides in water as 4 mg/L or ppm. Excess fluorides in water can have harmful effects ranging from discoloration or pitting of teeth to bone and skeletal damage.

Radon

Certain minerals are radioactive and people who drink water containing it over many years may have an increased risk of getting cancer. Radon is naturally occurring and

ground waters in some areas of India may be contaminated with it. The only way to be certain is to get the ground or well water tested. Activated Carbon filters are very good for the removal of radon from water supplies and it is the most common way to reduce Radon in the water.

Filtration Stages

The modern day domestic water purifiers combine different types of filtration methods into one unit. We will first discuss about the different steps or stages in a modern day water purifier.

1. A rough, pre or sediment filter for removal of large particles, like mud. The pore size of the sediment filter is usually about 20 microns. If the water contains a lot of mud or other larger particles, then this cartridge element becomes blocked quickly. It can be removed, cleaned by jetting with water and reused. It is like the cloth being reused after rinsing by the earlier generation.

2. A finer filter with pore size varying anywhere from 5 microns down to 1 micron or even less. These finer pore size filters can capture germs or microbes depending on its size and the filter pore size. The smaller the pore size, the more efficient it will be in capturing the microbes or germs. The disadvantage of having a very small size pore is that higher water pressure will be required to drive the

water through. If the pressure is not sufficient, the water coming out of the filter will be very slow. In gravity filtration the finer pore size will mean that the water will trickle through the pores much more slowly and it will take a much longer time to fill. Since these multi-stage purifiers normally have a germ killing device like UV or other germ killing methods at a later stage, any germs passing through the finer filter will be killed later. So a compromise is made usually by having a 5 micron second step filter cartridge.

3. An Activated Carbon water filter Block Cartridge element commonly referred to as an activated charcoal water filter, which adsorbs chemicals which cause smell and odour in the water. The activated carbon also adsorbs toxic organic chemicals like pesticides. It is very important to understand that there are many qualities of activated carbons and some may not be very efficient. Also the activated carbon has limited capacity to hold harmful chemicals, so make sure it is changed at the recommended intervals.

4. A germ killing device, usually UV light irradiating lamps, the so called e-boiling.

5. Other methods are by passing through special media which release chlorine, or through medium like nano-silver particles.

Ultraviolet (UV) water Sterilizers

UV water sterilizers are designed specifically to kill harmful microorganisms such as bacteria and viruses in water supplies. With a UV sterilizer you will have the peace of mind that the water is properly disinfected prior to drinking. UV does not introduce any harmful chemicals to your water. UV rays penetrate the cells of bacteria and viruses destroying their ability to reproduce. Without this ability, these organisms cannot multiply and eventually die. It is a simple but very effective process, with the system generally destroying 99.99% of harmful microbes. The normal UV unit for your Point of Use drinking water supply in the kitchen will use about the same amount of energy as a 40 watt light bulb. It is possible to connect the UV to an inverter or UPS, so that it can be operated even when there is no electricity.

Membrane based Water Filters

Ultra Filtration Membrane based water purifiers that are available in the

market, purify water by filtering out all dirt, viruses, germs and their eggs. This is because the **UF** membranes are such fine filters with pore size of **0.01 micron**. The size of the smallest virus, the very smallest of germs, is more than **0.02micron** in size and they are blocked by membranes whose pore size is less than **0.01 micron**.

Reverse Osmosis Water Purifier

To remove the dissolved matter from water the most efficient way is by RO.

Water purifiers use one or a combination of technologies to treat water and render it pure and palatable. The purification method you select should depend on the input water quality. It is therefore necessary to ascertain the level and nature of contamination of water in your area and to know what the total dissolved solids (TDS) level is. Once you know this, you can select a suitable brand based on the right purification method and price.

Reportedly, domestic water purifiers available in India are based on either of or a combination of three technologies – UV purification and filtration, reverse osmosis and chemical treatment. Reverse osmosis and UV purifiers are more expensive than the chemical based purification systems.



- An important point to remember while shopping for reverse osmosis water purifiers is to enquire about after sales service. Reverse Osmosis systems need servicing, thus poor service or the lack of it might adversely impact the functionality and efficacy of your water purification system.
- The semi permeable membrane used in a reverse osmosis purifier deteriorates rapidly if it is of low quality. This is another factor that you need to look into while shopping for a reverse osmosis water purification system.
- Remember to select a brand that is covered by an adequate warranty agreement. Time taken to make relevant vendor and user enquiries should make your investment worthwhile.
- Other disadvantages of RO are that it requires high water pressure and that some water is wasted in the reject stream. If there is not enough pressure in your pipeline then a small electric motor is required to pump the water to a high pressure.
- It wastes some water in its reject stream which carries all the concentrated impurities that was there in the water originally. This means that when it purifies say 1 liter of water, it drains away about half a liter of water in which all the impurities are concentrated. This waste water is known as the reject.
- This reject quantity of water goes up as the water becomes saltier or has more TDS. Normal home water supplies will get about 70% products or permeate pure water and the waste reject will be 30%. It may be possible to make use of the reject water, like for cleaning or watering plants.

Less Visible but Effective Water Purifiers

- The tap attachment which uses resin technology has been on the market for several years. The device is very economical and does not need electricity. However, low water pressure affects the passage of water through the device causing it to malfunction when water supply is not normal.
- The manufacturers claim that the technology eliminates all disease causing bacteria and viruses.
- It is worthwhile mentioning here that Zero B Suraksha, one of the tap attachment purifier tested is effective where TDS (total dissolved solids) levels are low. It is not known to remove dissolved solids. An inbuilt indicator signals expiry of the cartridge. It is important that the cartridge is changed immediately upon indication. We would suggest keeping a spare one is a good idea.

COMPARATIVE TESTING

Comparative Testing is a formal process by which different brands of a product category are tested for Quality, for conformance to the minimum standards laid down by Bureau of Indian Standards. Such a test also reveals if a particular tested brand exceeds such minimum standards, whether there can be potential health and safety hazards even under not-normal usage of the product and verification of special claims by manufacturers, if any. The results for all the tested brands are published in a Comparative Test Report which would provide consumers information to make an informed choice.

CONCERT has undertaken this project of Comparative Testing for Southern Region under a grant from Department of Consumer Affairs, Government of India. In the first year, Concert will be testing 7 products and 3 services. One of the products selected for testing is the Water Purifier.



Water Purifiers chosen for Test.

| SL.NO | Name of Water Purifier |
|-------|---|
| 1 | Eureka Forbes Aquasure Pearl- UV (UV Protection, ensures clear safe drinking water, free from excess chlorine, organic contamination, harmful pesticides, and dangerous organic compounds) |
| 2 | Whirl Pool –DLX-RO PURAFRESH (Removes all contaminants and micro-organisms) |
| 3 | Tata Swach (Storage) (Removes minimum 99.99% bacteria) |
| 4 | Zero-B-Suraksha (Tap Attachment) |
| 5 | HUL Marvella (RO + Micropurification+ROPL) (As safe as boiled water) |
| 6 | Kent Grand Plus Mineral RO (RO + UF + UV + TDS Control) (Double Purification, removes dissolved impurities, and maintains minerals) |
| 7 | HUL – Pureit(Storage) (As Pure as Boiled Water) |
| 8 | Kent-Gold Plus UF (Storage) (Makes water pure without using any chemicals like chlorine, Bromine etc. UF membrane, nano silver coated carbon filter) |
| 9 | Aquasure – Amrit Kitanu Magnet (Storage) 100% chemical free. Removes all disease carrying virus, bacteria, cysts |
| 10 | Zero-B-Suraksha Plus (Storage, 4+1 stages of purification) |
| | The above selected brands were purchased from reputed retail outlets, just as any consumer / buyer would do. |

PARAMETERS TESTED

1. PACKAGING AND LABELING

The label on the carton should have the following details and the same was verified.

1. Description of the product
2. No of units
3. Capacity
4. Manufacturer's Name and Address
5. Date/ Year of manufacture
6. MRP

2. MICROBIOLOGICAL

CONTAMINATION REDUCTION

The percentage reduction of the microbes

E coli – upto 99.9999%

MS2 Phage – upto 99.99%,

Cyst - upto 99.9% as per USEPA (United States Environmental Protection Agency) Norms.

For testing the microbiological contamination reduction the test standards used were USEPA Test protocol/NSF Protocol P 231 as there are no IS Standards for evaluation of this parameter.

3. PHYSICAL CONTAMINATION REDUCTION

Turbidity reduction less than 5 NTU (Nephelometric Turbidity Units).

4. CHEMICAL CONTAMINATION REDUCTION

Chlorine reduction to less than 0.2 ppm (parts per million)

Metal contaminant reduction (applicable for RO systems only)

Lead – less than or upto 50 ppb (parts per billion)

Arsenic – less than or upto 10 ppb

Mercury – less than or upto 1 ppb

5. PESTICIDE REDUCTION

Lindane, Malathion, Chlopyrifos, Endosulphan B – less than 0.2 ppb

6. TDS Reduction less than or equal to 90%

7. Hardness reduction – less than 300 ppm

8. pH – of the treated water should be 7

9. OPERATIONAL SUPPORT

10. WARRANTY :

Terms , parts and the period of warranty cover were verified and scored.

User Manual was checked for the following details:

1. Guide to aid Installation, Operation, and Maintenance of the Water Purifier
2. Technical Specifications
3. Recommended Input Water Quality Specifications (TDS, Total Hardness etc)
4. Specific Contaminants the Purifier can check
5. Safety Tips
6. Customer Care/Service Contact details
7. Contact Number for Consumer redressal
8. After Sales Service – Authorized

PRICE : MAXIMUM RETAIL PRICE**GENERAL COMPOSITION OF TEST WATER (INPUT) FOR ANY MICROBIOLOGICAL TESTS**

pH: 7 – 8

TDS (Total Dissolved Salts): 500 – 750 mg/L

Turbidity: < 1 NTU

TOC (Total Organic Carbon): 1 – 2 mg/L

Temperature of water: 26 – 30° C

For Turbidity: 15 ± 3 NTU of Turbidity in above water

For Chlorine: 1.8 – 2.2 mg/L of chlorine in above water

For RO purifiers, chemical reduction tests: At least 3 times higher than the Drinking water specification at input level (adjusted in mentioned water).

Sampling was done after 25 Liters of Water filtration had been done.

All the products were first flushed with 10 – 12 litres of Test Water without contaminants.

SCORING METHOD

Every test parameter was evaluated/ tested and scored. These were added to give the scoring to the sub-criterion. Each sub-criterion was added to determine the scoring for the major



criteria, each criterion, sub-parameter, and parameter was rated individually on a 5 point scale.

The rating given is as follows: **1 (Poor), 2 (Fair), 3 (Good), 4 (Very Good), and 5 (Excellent).**

In our tests any parameter that met the requirements of the defined standards was given the scoring of Good. When it exceeded the minimum standards substantially, it was rated Very Good. When it exceeded the standards significantly and showed appreciable innovation, it was rated Excellent.

In case the product failed to meet the standard it was awarded Fair or Poor based on the extent of shortfall from the Standard.

The results are presented against these major criteria which in our opinion is fair and without any subjective element. The user is

The results are tabulated below

| BRAND / CRITERIA | PACKAGING & LABELLING | MICROBIOLOGICAL | PHYSICAL | CHEMICAL | OPERATIONAL SUPPORT | MRP in Rs |
|------------------------------|-----------------------|-----------------|-----------|-----------|---------------------|-----------|
| HUL Pure it (Storage) | Good | Very Good | Good | Very Good | Very Good | 2000 |
| Aquasure Amrit (Storage) | Good | Good | Very Good | Good | Good | 2250 |
| Kent Gold Plus UF (Storage) | Good | NA* | Good | Good | Very Good | 2600 |
| Tata Swach (Storage) | Good | Good | Good | Good | Good | 1199 |
| Zero B Suraksha | Good | Poor | Poor | Poor | Good | 2090 |
| HUL Marvella (RO) | Good | Good | Good | Good | Good | 13500 |
| Whirlpool DLX – (RO) | Good | Good | Good | Good | Very Good | 14000 |
| Kent grand Plus mineral (RO) | Good | Good | Good | Good | Fair | 16500 |
| Aquasure Pearl (UV) | Good | Good | Fair | Poor | Fair | 7450 |
| Zero B Suraksha (Tap) | Good | Good | NA* | NA* | Poor | 349 |

Notes

- NA* – Not Applicable as the manufacturer does not claim reduction in Microbiological, Chemical and Physical contaminations
- Zero B Suraksha Storage type purifier did not meet the microbiological requirements reduction as per USEPA norms and the output water contained 0.55 ppm of Residual Iodine
- Zero B Suraksha Tap attachment test results show 0.41 ppm of Residual Iodine and may not be safe for persons with thyroid problems



GUIDE TO SELECTING THE RIGHT TYPE OF WATER PURIFIER FOR YOUR NEEDS

Water Purifiers can be divided into 2 categories:

1. Electric

The two types of electric water purifiers are:

- **Reverse Osmosis Purification system (RO)-** In this system water is pumped through a semi-permeable membrane. The semi-permeable membrane allows only the water to pass through and not contaminants or the impurities. Contaminants and the impurities are flushed down the drain.

RO water purifiers are by far the market leaders in water purification system for the following reasons:

1. These systems do not only get rid of disease bearing bacteria and viruses but also pollutants such as cancerous dyes and insecticides.

Thus making hard water pure, fresh, safe and drinkable for those living in coastal areas.

2. RO water purifiers do not use any chemicals such as chlorine or iodine and do not require filter changes or cleaning.

3. RO water purification system removes even the smaller particles from the drinking water. Most of these particles are smaller than the eye can see.

Indian markets are flooded with RO water purifiers ranging from 10,000 to 45,000 Rupees.

UV Radiations

- In this purification system the first is a filter that removes impurities.
- And then high-energy UV rays, generated from a UV lamp fitted inside the water purifier to eliminate micro-organisms.

UV Water purifiers are also good for the following reasons:

1. UV water purifier disinfects water much faster in most cases (within a few minutes) than other chemical water purification systems.
2. UV water purifier does not alter the chemical composition of water.
3. The taste, pH, odour and water properties remain the same even after purification in a UV water purifier.
4. UV Water purification system is 99.9 percent effective in removing the harmful microbes.

A UV water filter although 99.9% effective but still may not be effective if water is highly contaminated or turbid with organic materials, virus, bacteria and sediment that could hide from UV light.

2. Non-electric The two types of non-electric water purifiers are:
 - Tap attachment - These filters are fixed to the mouth of taps. These purifiers are portable

and need no electricity. In this system water is passed through a carbon candle filter or a membrane fitted inside.

Shortcomings

- (a) Do not remove metals such as lead and copper.
- (b) Also do not remove nitrate, bacteria or dissolved minerals.
- (c) The filter candle usually has a resin filter that needs to be changed every month.

Not suitable if the water contains chemical impurities

3. Storage Type- These types of water purifiers don't need electricity or plumbing. This system is a combination of sediment filters and activated carbon filters. Cartridges fitted inside are usually made of polypropylene fibre. These cartridges hold back particles to pass through.

- (a) Very helpful in places facing water shortage.
- (b) No electricity and running water required.
- (c) Affordable-The price ranges from 1000 to 3000 Rupees.
- (d) Many options available in the market.

Once you have decided upon the type of the water purifier you want, look at the other important factors like:

1. **Capability to reduce contamination** -

Get your water tested so that you can buy a home water purifier as per the filter requirements.

2. **Flow rate**- All water purifier has a maximum flow rate. If the flow rate is exceeded it will allow bacteria to pass through the system. So make sure to choose a water purifier that is adequate for your use.

3. **Body type**Make sure the body of the water purifier you chose is robust and rust free.

4. **Capacity**- Consider the capacity of the water purifier in sync with the number of members in your family.

5. **Maintenance cost**- Make sure you find out how often you need to change filter and the cost of each replacement cartridge.

6. **After sales support**-Make sure you read well regarding the reviews to find out about the after sales service support offered by the dealer/ manufacture.

7. **Installation & Money back guarantee** -

What if the water purifier does not filter or works properly soon after you buy? Make sure it comes with a money back guarantee, 30 day or more.

8. **Certifications** Make sure the manufacturer has either of these verified certifications:

- National Sanitation Foundation (NSF)
- Water Quality Associations (WAQ)
- Underwriters Laboratories

Armed with this information you can choose the right type , capacity and also the right Brand!!

COMPARATIVE TEST TEAM

Trustee in charge of project
Program Manager
Report compiled by Consultant Editor
Edited by
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